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TITLE: DIVERSITY ANTENNA SYSTEM AND COMMUNICATION EQUIPMENT

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ABSTRACT:

PROBLEM TO BE SOLVED: To compensate the attenuation due to transmission of a reception signal to the communication equipment without cost increase by connecting a high frequency amplifier to a reception exclusive antenna even via a cable or a connector

SOLUTION: In a portable telephone set or the like composed of a telephone set main body 3 and an external antenna unit 1 connecting thereto, a high frequency amplifier 7 is connected to a reception exclusive antenna 5 of the antenna unit 1 through a coaxial cable 29 and connectors 30, 31. At application of a DC voltage from a built-in battery +B of the telephone set main body 3 to a power supply section 9 through a power supply circuit 23 and a

coaxial cable 32, a high frequency amplifier 7 is active, a switch 8 is open,
and a reception signal from the reception exclusive antenna 5 is amplified by
the high frequency amplifier 7 and the amplified signal is fed to a receiver of
the telephone set main body 3. Furthermore, the transmission output of a
transmitter 19 is outputted by an output controller 18 by controlling an
amplification factor of an amplifier built in the transmitter 19.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] It connects with transmitters, such as a land mobile radiotelephone machine and a portable telephone, and this invention relates to transmitters, such as suitable diver city antenna equipment and a suitable land mobile radiotelephone machine, and a portable telephone.

[0002]

[Description of the Prior Art] A conventional radiotelephone, especially a conventional land mobile radiotelephone machine (a digital method or analog form) are used by using diver city antenna equipment as external antenna equipment, connecting with the body of telephone. In that case, connection **** is made common between an antenna and the bodies of diver city antenna equipment, and for between diver city antenna equipment and the bodies of telephone through a cable and connectors, such as a coaxial cable. In addition, a carrier frequency is for example, a 1 or 5GHz band in this case.

[0003]

[Problem(s) to be Solved by the Invention] According to this conventional radiotelephone, there is a fault that the input signal (RF signal) which received with the antenna declines considerably by the coaxial cable and connector which connect between an antenna and the bodies of diver city antenna equipment and between diver city antenna equipment and the bodies of telephone.

[0004] Although it is possible to insert a booster between diver city antenna equipment and the body of telephone as a means to solve this, the price of a booster is high, and since expertise is required for anchoring of a booster, moreover, it is impossible that a user adopts a booster.

[0005] Even if it uses this diver city antenna equipment for a transmitter, connecting through a cable or a connector in view of this point in the diver city antenna equipment with which this invention is equipped with a transceiver antenna and a reception only antenna, the rise of a price tends to be accompanied by it and carried out not much, and it is going to propose the diver city antenna equipment with which attenuation by transmission to the transmitter of an input signal can be compensated.

[0006] Moreover, in diver city antenna equipment equipped with a transceiver antenna and a reception only antenna, while this invention connects the high-frequency amplifier to a reception only antenna Even if it makes it operating state and uses it through a cable or a connector by giving operating voltage to this high-frequency amplifier, connecting this diver city antenna equipment to a transmitter While being able to accompany by it

and carry out the rise of a price and being able to compensate attenuation by transmission to the transmitter of an input signal, even when seldom supplying operating voltage to the high-frequency amplifier, it is going to propose the diver city antenna equipment which can transmit an input signal to a transmitter.

[0007] Furthermore, even if diver city antenna equipment equipped with a transceiver antenna and a reception only antenna connects and uses this diver city antenna equipment for the body of a transmitter through a cable or a connector in the transmitter connected to the body of a transmitter, not much, this invention does not tend to be accompanied by it, is going to carry out the rise of a price, and it tends to propose the transmitter with which attenuation by transmission on the body of a transmitter of an input signal can be compensated.

[0008] Furthermore, while diver city antenna equipment equipped with a transceiver antenna and a reception only antenna connects the high-frequency amplifier to a reception only antenna in the transmitter connected to the body of a transmitter, this invention Even if it makes it operating state and uses it through a cable or a connector by giving operating voltage to this high-frequency amplifier, connecting this diver city antenna equipment to the body of a transmitter While being able to accompany by it and carry out the rise of a price and being able to compensate attenuation by transmission on the body of a transmitter of an input signal, even when seldom supplying operating voltage to the high-frequency amplifier, it is going to propose the transmitter which can transmit an input signal to the body of a transmitter.

[0009] Furthermore, this invention tends to propose the transmitter with which it can enable it to obtain the predetermined transmitting output specified in the base station from a transmitting antenna in the transmitter by which the transmitting antenna and the receiving antenna were connected to the body of a transmitter.

[0010] Furthermore, this invention is set to the transmitter by which the transmitting antenna and the receiving antenna were connected to the body of a transmitter. Even if it uses it through a cable or a connector, connecting a receiving antenna to a transmitter, while being able to accompany by it and carry out the rise of a price not much and being able to compensate attenuation by transmission to the transmitter of an input signal It is going to propose the transmitter with which it can enable it to obtain the predetermined transmitting output specified in the base station from a transmitting antenna.

[0011]

[Means for Solving the Problem] The diver city antenna equipment by this invention is characterized by connecting the high-frequency amplifier to a reception only antenna in diver city antenna equipment equipped with a transceiver antenna and a reception only antenna.

[0012] According to this this invention, the input signal received by the reception only antenna is amplified by the high-frequency amplifier. Consequently, attenuation by the cable and connector of an input signal at the time of supplying this diver city antenna equipment to a transmitter through a cable and a connector can be compensated by magnification by the high-frequency amplifier.

[0013]

[Embodiment of the Invention] Below, the gestalt of operation of this invention is explained with reference to drawing 1 . Drawing 1 shows the land mobile radiotelephone machine as a transmitter, a fixed radiotelephone, or a portable telephone (for example,

telephone which carrier frequency uses with a 1.5GHz band), and this telephone consists of external antenna units 1 connected with the body 3 of telephone at this.
[0014] First, the external diver city antenna unit 1 is explained. 4 is a transceiver antenna and 5 is a reception only antenna. Antennas 4 and 5 are connected to connectors 27 and 30 through coaxial cables 26 and 29, respectively, and connectors 27 and 30 are combined with the connectors 28 and 31 attached in the box object (not shown) of an external antenna unit, respectively. In addition, for a rod antenna or both, either may be [a microstrip antenna (flat antenna) and another side of antennas 4 and 5 / a microstrip antenna (flat antenna) or both] rod antennas.
[0015] The transmission level detector 6 which detects the output level of a sending signal is connected to the transceiver antenna 4 through a coaxial cable 26 and connectors 27 and 28, and the transmission level detecting signal (a direct current signal or low frequency signal) is transmitted to the body 3 of telephone through a coaxial cable 32 and connectors 33 and 34 at the time of transmission. The operating voltage from a power supply section 9 is supplied to this level detector 6. In addition, the input signal from the transceiver antenna 4 only passes a level detector 6, and is supplied to the transceiver antenna 4.
[0016] The high-frequency amplifier 7 is connected to the reception only antenna 5 through a coaxial cable 29 and connectors 30 and 31, and the magnification input signal is supplied to the body 3 of telephone through a coaxial cable 32 and connectors 33 and 34. It is made as [supply / the operating voltage from a power supply section 9] by this high-frequency amplifier 7.
[0017] An on-off switch 8 is connected [this] to a high-frequency amplifier 7 at juxtaposition. Turning on and off of this on-off switch 8 is controlled by the power supply section 9. Through connectors 34 and 33 and a coaxial cable 32, a power supply section 9 supplies the operating voltage based on the direct current voltage supplied from the body 3 of telephone to a level detector 6 and the high-frequency amplifier 7, as mentioned above, but further, this power supply section 9 turns OFF a switch 8, when direct current voltage is supplied from the body 3 of telephone, and when not supplied, it controls a switch 8 to turn ON a switch 8. In addition, 10 is the RF inhibition filter connected between the coaxial cable 32 and the power supply section 9.
[0018] Next, the body 3 of telephone is explained. The lead wire L12 connected to the lead wire L11 connected to the high frequency inhibition filter 10 of an antenna unit 11 and a level detector 6 shall be connected to the lead wire L21 and L22 of the body 3 of telephone through the coaxial cable 32 drawn from the antenna unit 1, the connector 33 at the tip of the coaxial cable 32 and its connector 33, and the connector 34 combined. In addition, lead wire L21 is connected to a receiver 22 and the RF inhibition filter 24, and lead wire L22 is connected to an isolator 16 and the RF inhibition filter 17.
[0019] The transmission level detecting signal from the transmission level detector 6 of an antenna unit 1 is supplied to the output-control machine 18 through a coaxial cable 32, connectors 33 and 34, and the RF inhibition filter 17. the amplification factor of the amplifier which is a transmitter and is built in this should boil 19 output-control machine 18 -- it ******. Moreover, the output-control machine 18 is controlled by CPU20 which controls the body 3 of telephone. time [namely,] the output level of the sending signal by the transceiver antenna 4 of an antenna unit 1 is low -- the transmitting output of a transmitter 19 -- high -- becoming -- ********** of a sending signal -- when high, the

amplification factor of the amplifier of a transmitter 19 is controlled so that the transmitting output of a transmitter 19 becomes low. The sending signal from a transmitter 19 is supplied to the transceiver antenna 4 through an isolator 16, connectors 34 and 33, a coaxial cable 32, and the level detection 6. In addition, the telephone transmitter of ** which is not illustrated and a telephone shall be connected to a transmitter 19.

[0020] The input signal from the transceiver antenna 4 is supplied to a receiver 21 through a level detector 6, a coaxial antenna 32, connectors 32 and 33, and an isolator 16. The input signal from the reception only antenna 5 is supplied to a receiver 22 through a coaxial antenna 32 and connectors 32 and 33 at a high-frequency amplifier 7 or switch 8 list. In addition, ** which omits illustration, the comparator with which the level is compared, and the switch controlled by the comparison output from the comparator are formed, and the input signal from receivers 21 and 22 is made as [supply / to the earphone which omitted illustration / the sound signal based on an input signal with high receiving level].

[0021] A power circuit 23 is supplied to the power supply section 9 of an antenna unit 1 through the high frequency inhibition filter 24, connectors 34 and 33, a coaxial cable 32, and the high frequency inhibition filter 10 while it supplies operating voltage to each part of the body 3 of telephone in response to the direct current voltage from built-in cell +B.

[0022] Actuation of the portable telephone of this example is explained. A switch 8 becomes off while the high-frequency amplifier 7 will be in operating state, when the direct current voltage from built-in cell +B of the body 3 of telephone is supplied to a power supply section 9 through the coaxial cable 32 with which a power circuit 23 and a transceiver signal are transmitted. After the input signal from the reception only antenna 5 of an antenna unit 1 is amplified by the high-frequency amplifier 7, it is transmitted to the receiver 22 of the body 3 of telephone. In addition, when the operating voltage from the body 3 of telephone is not supplied to a power supply section 9, a high-frequency amplifier 7 does not operate but a switch 8 is turned on.

[0023] The transmitting output of a transmitter 19 is controlled by control of the amplification factor of the amplifier built in the transmitter 19 with the output-control machine 18 based on the disregard level by the transmission level detector 6 which detects the transmitting output of transmission of the transceiver antenna 4. When the transmitting output level of a sending signal is low, the transmitting output of a transmitter 19 is made high, and when the level of the transmitting output of a sending signal is high, the transmitting output of a transmitter 19 is made low, and it is controlled to become the power specified from the base station.

[0024] In addition, the example of drawing 1 is applicable also to transmitters, such as a portable telephone, a land mobile radiotelephone machine, and a fixed radiotelephone.

[0025] Next, with reference to drawing 2 , the same sign is given to drawing 1 and a corresponding part in ** and drawing 2 explaining the land mobile radiotelephone machine of other examples of this invention, and duplication explanation is omitted. In this example, it is the case where the adapter 2 for mount as a power unit is inserted between the external diver city antenna unit 1 and the body 3 of telephone.

[0026] The connector 33 at the tip of the coaxial cable 32 drawn from the external antenna unit 1 is combined with the connector 35 attached in the box object which omitted illustration of the adapter 2 for mount. The connector 37 at the tip of the coaxial

cable 36 drawn from the adapter 2 is combined with the connector 34 attached in the box object of the body 3 of telephone. And it is made as [connect / through a coaxial cable 36 and connectors 37 and 34 / between the lead wire L11 and L12 of an antenna unit 1, and the lead wire L21 and L22 of the body 3 of telephone / to a coaxial cable 32, connectors 33 and 35, and a list / the lead wire L31 and L32 of an adapter 2].

[0027] It is made as [supply / direct current voltage / by built-in cell +B of an adapter 2 / to the power supply section 9 of an antenna unit 1 / through the high frequency inhibition filter 13, connectors 35 and 33, a coaxial cable 32, and the high frequency inhibition filter 10]. Therefore, in this case, the direct current voltage from built-in cell +B of telephone 3 is only supplied to the power circuit 23 which supplies operating voltage to each part of the body 3 of telephone, and is not supplied to an antenna unit 1. And transmission of the input signal between an antenna unit 1 and the body 3 of telephone and a sending signal is performed through a coaxial cable 32, connectors 33 and 35, a coaxial cable 36, and connectors 37 and 34. Since other configurations and actuation are the same as that of the example of drawing 1 , duplication explanation is omitted.

[0028] In addition, the example of drawing 2 is applicable not only to a land mobile radiotelephone machine but transmitters, such as a portable telephone and a fixed radiotelephone.

[0029]

[Effect of the Invention] Since the high-frequency amplifier was connected to the reception only antenna in diver city antenna equipment equipped with a transceiver antenna and a reception only antenna according to the 1st this invention, even if it uses it through a cable or a connector, connecting this diver city antenna equipment to a transmitter, the rise of a price can be accompanied by it and carried out not much, and the diver city antenna equipment with which attenuation by transmission to the transmitter of an input signal can be compensated can be obtained. For this reason, the installation of a transmitter to diver city antenna equipment can be set up comparatively freely.

[0030] Since the operating voltage from a power unit was supplied to the high-frequency amplifier in the diver city antenna equipment of the 1st this invention through the cable with which the input signal from a reception only antenna is transmitted according to the 2nd this invention In addition to the effectiveness of the 1st this invention, the diver city antenna equipment which can supply operating voltage from a power unit to diver city antenna equipment can be obtained, without increasing the transmission line between diver city antenna equipment and the body of a transmitter.

[0031] According to the 3rd this invention, it sets to the diver city antenna equipment of the 1st this invention. When the on-off switch connected to the high-frequency amplifier at juxtaposition and the operating voltage from a power unit are supplied to a high-frequency amplifier Since the on-off switch was turned OFF, and the control means turned ON was established when not supplied Even when not supplying operating voltage to the high-frequency amplifier in addition to the effectiveness of the 1st this invention The ** by which the diver city antenna equipment which can transmit an input signal to a transmitter is not supplied to operating voltage by the high-frequency amplifier of diver city antenna equipment from a power unit, Even when not carrying out high frequency actuation, the input signal from a reception only antenna can be made to output from diver city antenna equipment. Diver city antenna equipment can be obtained.

[0032] Since diver city antenna equipment equipped with a transceiver antenna and a

reception only antenna connected the high-frequency amplifier to the reception only antenna in the transmitter connected to the body of a transmitter according to the 4th this invention Even if it uses it through a cable or a connector, connecting this diver city antenna equipment to the body of a transmitter, the rise of a price can be accompanied by it and carried out not much, and the transmitter with which attenuation by transmission on the body of a transmitter of the input signal from diver city antenna equipment can be compensated can be obtained.

[0033] Since the operating voltage from the body of a transmitter was supplied to the RF amplifying circuit in the transmitter of the 4th this invention through the cable with which the input signal from a reception only antenna is transmitted according to the 5th this invention In addition to the effectiveness of the 4th this invention, the transmitter which can supply operating voltage from a power unit to diver city antenna equipment can be obtained, without increasing the transmission line between diver city antenna equipment and the body of a transmitter.

[0034] When the on-off switch connected to the high-frequency amplifier at juxtaposition and the operating voltage from the body of a transmitter are supplied to a high-frequency amplifier in the transmitter of the 4th this invention according to the 6th this invention Since the on-off switch was turned OFF, and the control means turned ON was established when not supplied Even when not supplying operating voltage to the high-frequency amplifier in addition to the effectiveness of the 4th this invention The ** by which the diver city antenna equipment which can transmit an input signal to the body of a transmitter is not supplied to operating voltage by the high-frequency amplifier of diver city antenna equipment from a power unit, Even when the high-frequency amplifier does not operate, the transmitter which can transmit the input signal from a reception only antenna to the body of a transmitter can be obtained.

[0035] In the transmitter by which the transmitting antenna and the receiving antenna were connected to the body of a transmitter according to the 7th this invention Since it comes to connect a transmission level detector with a transmitting antenna and the transmitting output of the transmitter of the body of a transmitter was controlled according to the disregard level from the transmission level detector According to field strength, the transmitter with which it can enable it to obtain the predetermined transmitting output specified in the base station from a transmitting antenna can be obtained.

[0036] Since the detecting signal from a transmission level detector was supplied to the transmitter in the transmitter of the 7th this invention through the cable with which the sending signal connected between the transmitting antenna and the body of a transmitter is transmitted according to the 8th this invention In addition to the effectiveness of the 7th this invention, the transmitter which can supply the detecting signal from a transmission level detector to a communication link body from a transmitting antenna can be obtained, without increasing the transmission line between a transmitting antenna and the body of a transmitter. .

[0037] In the transmitter by which diver city antenna equipment equipped with a transceiver antenna and a reception only antenna was connected to the body of a transmitter according to the 9th this invention Since it has the high-frequency amplifier connected to the reception only antenna, and the transmission level detector connected to the transceiver antenna and the transmitting output of the transmitter of the body of a

transmitter was controlled according to the disregard level from the transmission level detector Even if it uses it through a cable or a connector, connecting this diver city antenna equipment to the body of a transmitter While being able to accompany by it and carry out the rise of a price not much and being able to compensate attenuation by transmission on the body of a transmitter of the input signal from diver city antenna equipment, the transmitter which can control a transmitting output can be obtained according to field strength.

[0038] In the transmitter by which diver city antenna equipment equipped with the antenna for transmission and reception and a reception only antenna was connected to the body of a transmitter according to the 10th this invention When the high-frequency amplifier connected to the reception only antenna, the on-off switch connected to the high-frequency amplifier at juxtaposition, and the operating voltage from the body of a transmitter are supplied to a high-frequency amplifier The control means which turns OFF an on-off switch, and is turned ON when not supplied, Since it has the transmission level detector connected to the transceiver antenna and the transmitting output of the transmitter of the body of a transmitter was controlled according to the disregard level from the transmission level detector Even if it uses it through a cable or a connector, connecting this diver city antenna equipment to the body of a transmitter While being able to accompany by it and carry out the rise of a price not much and being able to compensate attenuation by transmission on the body of a transmitter of the input signal from diver city antenna equipment Even when the high-frequency amplifier does not operate, the input signal from a reception only antenna can be transmitted to the body of a transmitter, and the transmitter with which it can enable it to obtain the predetermined transmitting output specified in the base station can be obtained from a transceiver antenna.

[Translation done.]